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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,528	03/23/2004	Takayuki Yamagishi	ASMJP.146AUS	3438
20995	7590	02/17/2006	EXAMINER	
KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614			DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 02/17/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/807,528

Applicant(s)

YAMAGISHI ET AL.

Examiner

Rakesh K. Dhingra

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 18-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-27 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03/23/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)              |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____.  |

Art Unit: 1763

## **DETAILED ACTION**

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-17, drawn to apparatus, classified in class 118, subclass 723E.
- II. Claims 18-27, drawn to method, classified in class 427, subclass 535.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the method specifies heating of substrate up to a given temperature while the apparatus does not specify substrate heating and thus the apparatus can be used to practice a materially different process.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Katsuhiro Arai on 02/01/06 a provisional election was made without traverse to prosecute the invention of Group I, Claims 1-17.

Affirmation of this election must be made by applicant in replying to this Office action.

Art Unit: 1763

Claims 18-27 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Specification***

The disclosure is objected to because of the following informalities:

- 1) Paragraph 0044, line 6 – it is requested to verify the sentence “The impedance matching circuit 10 ----- becomes 0” since no measurement units are given after “50”, “10” and “200”;
- 2) Paragraph 0044, line 12 - it is suggested to verify the sentence “ The radio frequency transmission unit 22 -----in parallel, equivalent inductors 41 and 42 which are connected to each other in series and to inductor 37 in parallel and -----the inductor 38 in series” since the underlined words do not match with Figures 2, 3;
- 3) Paragraph 0046 – it is suggested that the sentence “The first radio-frequency ----- and through the branch point 39” may please be replaced with sentence “The first radio-frequency -----and through the branch point 39 and via inductor 41”.
- 4) Paragraph 0050 – is suggested to replace “impedance characteristic” with “characteristic impedance”.

Appropriate correction is required.

Art Unit: 1763

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claim 8 recites the limitation "the hollow copper tube" in line 4. There is insufficient antecedent basis for this limitation in the claim, since claims 6,1 do not recite "hollow copper tube". For the purpose of examination on merits this limitation has been interpreted as "a hollow copper tube inductor".

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1763

**Claims 1-5, 6, 9, 14-17 are rejected under 35 U.S.C. 102(b) as being unpatentable over Murata et al (US Patent No. 6,363,881) in view of Stimson et al (US Patent No. 6,254,738 and Gisselberg et al (US PG PUB No. 2003/0052785).**

Regarding Claims 1,2,4,5,15-17: Murata et al teach a plasma treatment apparatus (Figures 1, 2, 4) for thin-film deposition comprising:

a reactor chamber 31;

a pair of parallel-plate electrodes 32, 34 disposed inside the chamber, between which a thin film is to be formed on a substrate 33; and

a radio-frequency power supply system (high frequency source 36, impedance converters 61a-h, power distributor 60 and impedance matching network 35) used for transmitting radio-frequency power to electrode 32 via multiple supply points 44-51 provided on the electrode 32,

said radio-frequency power supply system comprises:

a radio-frequency power source 36; and

a power distributor (radio-frequency transmission unit) 60 for transmitting radio-frequency power from the radio-frequency power source 32 to the multiple supply points 44-51 of the electrode 32;

said radio-frequency transmission unit comprising:

an inlet transmission path 59 and coaxial cables (multiple branches) 41a-h branched off from the inlet transmission path, wherein each branch connected to the supply point 44-51 of the electrode 32 is multiple branchings ( $2 \times 4 = 8$ ) downstream of the inlet transmission path (Figures 1-3 and Column 7, line 3 to Column 8, line 25).

Art Unit: 1763

Murata et al also teach impedance converters (inductance adjuster) 61a-61h in each of the branches going to current introducing terminals 42a-h to achieve impedance matching among power distributor 60, coaxial cables 43a-h, and the electrode 32 (for equalizing characteristic impedance in each line) [Column 8, lines 25-40].

Murata et al do not teach removable inductance adjusters.

Stimson et al teach an apparatus (Figures 2, 3, 5, 6) that includes an impedance matching network 306 with a tunable inductor 318 whose inductance is adjusted by rotating (moving) core 318c within the coil 318 (Column 5, line 50 to Column 6, line 20 and Column 11, lines 35-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use removable inductance adjusters as taught by Stimson et al in the apparatus of Murata et al to eliminate requirement of re-matching of the RF coil (Column 3, lines 15-28).

Murata et al in view of Stimson et al teach movable core but do not teach removable core.

Gisselberg et al teach an apparatus (Figures 1, 4, 5) that includes a tunable resonator (marker) assembly 10 tat includes a coil 12 wounda round a core 14 to form an inductor. An end cap 32 is axially movable on core 28 for adjusting the inductance of the inductor. Gisselberg et al also teach (Claim 39) that ferromagnetic material can be removed from the core to adjust inductance (Paragraph 0037, 0052).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use movable/removable core as taught by Gisselberg et al in the apparatus

Art Unit: 1763

of Murata et al in view of Stimson et al to enable change the inductance of the coil for achieving resonance (Paragraph 0052).

Regarding Claim 3: Murata et al teach (Figure 2) that each branch 43a-h connected to the multiple supply points 44-51 is two branchings downstream (Figure 3) of the inlet transmission path, and four branches (43a-d and 43e-h) are connected to the multiple supply points 44-51 (Column 8, lines 5-25).

Regarding Claim 6: Murata et al teach that impedance converter (inductance adjuster) 61a-h comprises of ferrite core (Figure 7 and lines 30-40).

Regarding Claim 9: Murata et al teach that power distributor 60 has a frequency of 30 MHz to 200 MHz (about 27.12 MHz or higher)) {Column 5, lines 55-60}.

Regarding Claims 14, 17: Murata et al teach cable 59 (Figure 2) connected between impedance matching network 35 and power distributor 60 but do not explicitly disclose it to be coaxial cable. But since Murata et al teach all other cables 41a-h, 43a-h to be coaxial cables, cable 59 would also be a coaxial cable due to high frequency power applications (Column 7, lines 55-68).

**Claim 7 is rejected under 35 U.S.C. 102(b) as being unpatentable over Murata et al (US Patent No. 6,363,881) in view of Stimson et al (US Patent No. 6,254,738) and Gisselberg et al (US PG PUB No. 2003/0052785) as applied to Claim 1 and further in view of Blonigan et al (US PG PUB No. 2002/0046989).**

Regarding Claim 7: Murata et al in view of Stimson et al and Gisselberg et al teach all limitations of the claim including that impedance converters (inductors) 61a-h enable to achieve impedance matching between power distributor 60, coaxial cables 43a-h and



Art Unit: 1763

electrode 32 (substantially equal impedance {includes inductive reactance} values in branches) [Murata et al, Figure 2 and Column 8, lines 25-40].

Murata et al in view of Stimson et al and Gisselberg et al do not teach metal plate in power transmission unit.

Blonigan et al teach an apparatus (Figures 1-3) that includes a power supply system 50 that includes inductor 240 and supplies power at multiple points on showerhead (electrode) 122 through a backing (metal) plate 126 (Paragraphs 0022, 0025-0026).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use metal plate as part of power transmission system as taught by Blonigan et al in the apparatus of Murata et al in view of Stimson et al and Gisselberg et al to provide electrical connectivity between showerhead and plural outputs from the matching network (Paragraph 0006).

**Claims 8, 11 are rejected under 35 U.S.C. 102(b) as being unpatentable over Murata et al (US Patent No. 6,363,881) in view of Stimson et al (US Patent No. 6,254,738) and Gisselberg et al (US PG PUB No. 2003/0052785) as applied to Claims 6, 7 and further in view of Blonigan et al (US PG PUB No. 2002/0046989) and Chawla et al (US Patent No. 5,187, 457).**

Regarding Claims 8, 11: Murata et al in view of Stimson et al and Gisselberg et al teach all limitations of the claim as explained above including that impedance converters (inductors) 61a-h are circular ring shaped (Murata et al, Figure 7) and enable to achieve impedance matching between power distributor 60, coaxial cables 43a-h and electrode 32 (substantially equal impedance values in branches) and that inductance (impedance)

Art Unit: 1763

value can be adjusted by moving of ferrite core within the coils (inductor) or even by removing ferrite material from the core (adjusting for quantity of core).

Murata et al in view of Stimson et al and Gisselberg et al do not teach metal plate and inductors as hollow copper tubes.

Blonigan et al teach an apparatus (Figures 1-3) that includes a power supply system 50 that includes inductor 240 and supplies power at multiple points on showerhead (electrode) 122 through a backing (metal) plate 126 (Paragraphs 0022, 0025-0026).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use metal plate as part of power transmission system as taught by Blonigan et al in the apparatus of Murata et al in view of Stimson et al and Gisselberg et al to provide electrical connection between showerhead and plural outputs from the matching network (Paragraph 0006).

Murata et al in view of Stimson et al, Gisselberg et al and Blonigan et al do not teach inductors as hollow copper tubes.

Chawla et al teach an apparatus (Figures 1-3) that includes a RF power source 10, a filter 16, matching network 14 and plasma chamber 12. Chawla et al further teach that inductor  $L_{\text{sub.1}}$  is a coil formed of copper tube (Column 3, line 20 to Column 4, line 45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use hollow copper tube inductor as taught by Chawla et al in the apparatus of Murata et al in view of Stimson et al, Gisselberg et al and Blonigan et al to enable copper tube act as heat sink (Column 4, lines 35-40).

Art Unit: 1763

**Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al (US Patent No. 6,363,881) in view of in view of Stimson et al (US Patent No. 6,254,738 and Gisselberg et al (US PG PUB No. 2003/0052785) as applied to Claim 1 and further in view of Parsons (US Patent No. Patent No. 6,884,635).**

Regarding Claim 10: Murata et al in view of Stimson et al and Gisselberg et al teach all limitations of the claim except rotational symmetry of connection points.

Parsons teach an apparatus (Figures 1, 2) that includes a master oscillator (power supply system) 210 that supplies power to plurality of electrode segments 62a, 62b----62n at multiple points and where the segments (connection points) are in rotational symmetry with respect to center of electrode surface (Abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use rotational symmetry of connection points as taught by Parsons in the apparatus of Murata et al in view of Stimson et al and Gisselberg et al to provide uniform plasma density.

**Claims 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al (US Patent No. 6,363,881) in view of in view of Stimson et al (US Patent No. 6,254,738 and Gisselberg et al (US PG PUB No. 2003/0052785) as applied to Claim 1 and further in view of DeOrnellas et al (US Patent No. 6,190,496).**

Regarding Claims 12,13: Murata et al in view of Stimson et al and Gisselberg et al teach all limitations of the claim except second radio frequency power source.

Art Unit: 1763

DeOrnellas et al teach an apparatus (Figure 1) that includes a reactor chamber 22, an upper electrode grounded electrode 24 and a bottom electrode 28 that is connected to a first high frequency power supply 30 and also a second power supply 32 where the power supply 32 is operated at 450KHz (Column 2, line 65 to Column 3, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use second power source connected to plasma electrode as taught by DeOrnellas et al in the apparatus of Murata et al in view of Stimson et al and Gisselberg et al to enable better plasma density control (Column 3, lines 30-40).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

**Scherer (US Patent No. 6,262,638)** teach an apparatus (Figure 6) that includes a resonator 60, which has an inductor 62, formed by a coiled hollow copper tube.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1763

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763